

Appl No. : 10/521,671
Filed : September 15, 2005

REMARKS

In response to the Office Action mailed November 14, 2007, Applicant has amended the application as above. No new matter is added by the amendments as discussed below. Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the amendments and the remarks set forth below.

Discussion of Claim Amendments

Claims 10-12 and 16 have been cancelled. Claims 1-9 and 13-15 have been amended. Upon the entry of the amendments, Claims 1-9 and 13-15 are pending in this application. The amendments to Claims 1, 2, 4, 5 and 7 and 8 are supported, for example, by the specification at paragraphs at [0053]-[0061] and Figure 3. The amendments to the remaining claims are merely for clarification and do not narrow the scope of protection. Furthermore, the amendments to the claims do not introduce any new matter. Entry of the amendments is respectfully requested.

Discussion of Claim Objections

The Examiner objected to Claims 1-16 asserting that there are certain informalities in the claims. Applicant respectfully disagrees. However, in order to expedite the prosecution of this application, Claims 1-9 and 13-15 have been amended as above. Further, Claims 10-12 and 16 have been cancelled.

With respect to Claim 2, the Examiner suggested changing “a set comprising terms” to “a set of comprising terms.” Applicant respectfully submits that the word “set” of “a set comprising terms” means, for example, “group.” In addition, “a set comprising terms” means “a set that comprises terms.” To clarify the feature, “a set comprising terms” has been amended to “a set that comprises terms.”

With respect to Claims 1-16, the Examiner suggested changing “safety verification” to “security verification.” Applicant respectfully submits that “safety verification” is a proper term in the claimed invention because the invention is not limited to “checking cipher communication procedure.” For example, the invention can be used for checking an operational procedure of a reactive system, as described in the specification of this application. That is, “safety verification” denotes checking not only cipher communication procedure but also checking an operational

Appl No. : 10/521,671
Filed : September 15, 2005

procedure of a reactive system that receives external stimuli during operation and responds to the stimuli repeatedly if it is described as intended (see paragraph [0004] in the specification of this application). In addition, according to one embodiment of the present invention, safety of procedures for controlling other reactive systems, for example, nuclear reactors and aircrafts can be verified (see paragraph [0128]).

Discussion of Rejections of Claims under 35 U.S.C. § 101

Claims 1, 2, 4, 5, 7, 8, 10 and 11 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Applicant respectfully disagrees. However, in order to expedite the prosecution of this application, Claims 10-12 and 16 have been cancelled and independent Claims 1, 2, 4, 5, 7 and 8 have been amended to resolve the issues addressed by the Examiner as reflected in the "AMENDMENTS TO THE CLAIMS" section. Applicant would like to address the Examiner's rejections as follows.

1. Discussion of Claims 1, 2, 4, 5, 7 and 8

The Examiner asserts that the subject matter of Claims 1, 2, 4, 5, 7 and 8 fails to produce a real-world tangible result as output. Applicant respectfully submits that each of amended Claims 1, 2, 4, 5, 7 and 8 provides a real-world tangible result as output. As recited in Claims 1, 2, 4, 5, 7 and 8, the claimed invention is used for a safety verification device or method for *an electronic reactive system such as a cipher communication system or control system for a nuclear reactor or aircraft*. Thus, Applicant respectfully submits that amended Claims 1, 2, 4, 5, 7 and 8 provide a real-world tangible result as output. Applicant would like to point out that the cipher communication system and control system for a nuclear reactor or aircraft are merely examples of an electronic reactive system and the claimed invention is not limited to those systems. For example, the claimed invention can also be used for services which are provided via public networks and dedicated networks in the industrial fields such as financial industry and electronic commerce can be verified. *See paragraph [0129]*. In view of the above, Applicant respectfully submits that each of Claims 1, 2, 4, 5, 7 and 8 produces a real-world tangible result as output.

Appl No. : 10/521,671
Filed : September 15, 2005

The Examiner asserts that the claimed subject matter is merely a non-functional or functional descriptive material. Applicant respectfully disagrees. According to MPEP 2106.01, examples of descriptive material are music, literature, art, photographs, and mere arrangements or compilations of facts or data, without any functional interrelationship. However, Claims 1, 2, 4, 5, 7 and 8 are directed to a device (machine) or method (process) which includes elements or steps that are operationally and functionally interrelated to each other. Furthermore, the system has provided use in the technological arts as discussed above. In view of the above, Applicant respectfully submits that each of Claims 1, 2, 4, 5, 7 and 8 is not directed to merely a non-functional or functional descriptive material.

2. Discussion of Claims 4 and 5

The Examiner asserts that the subject matter of Claims 4 and 5 is not technologically and tangibly embodied and is merely an abstraction of modeling. However, as discussed above, each of amended Claims 4 and 5 is used for a safety verification method for *an electronic reactive system such as a cipher communication system or control system for a nuclear reactor or aircraft*. In view of the above, Applicant respectfully submits that each of Claims 4 and 5 is technologically and tangibly embodied, and concrete.

3. Discussion of Claims 7 and 8

The Examiner asserts that the subject matter of Claims 7 and 8 is directed to non-statutory subject matter because the claim limitations are recited as a series of program codes which appear to be directed to an abstract idea without limitation to a practical application. The Examiner further asserts that the claimed subject matter is not tangible and concrete.

First, Applicant respectfully submits that a claim directed to a computer readable medium is statutory subject matter. *See In Re Beauregard (53 F. 3d 1583)*. Furthermore, as discussed above, each of amended Claims 7 and 8 recites a computer-readable recording medium containing a reactive system safety verification computer program, *said reactive system being an electronic system such as a cipher communication system or control system for a nuclear reactor*

Appl No. : 10/521,671
Filed : September 15, 2005

or aircraft. In view of the above, Applicant respectfully submits that the claimed subject matter is tangible and concrete, and provides useful results.

4. Summary

In view of the above, Applicant respectfully submits that amended Claims 1, 2, 4, 5, 7 and 8, and their dependent claims are directed to statutory subject matter. Withdrawal of the rejections is respectfully requested.

Discussion of Rejections of Claim under 35 U.S.C. § 112, ¶ 2

Claims 1 and 2 were rejected under 35 U.S.C. § 112, second paragraph as being incomplete for omitting essential elements. Applicant respectfully disagrees. However, in order to expedite the prosecution of this application, Claims 1 and 2 have been amended to resolve the issues addressed by the Examiner as reflected in the "AMENDMENTS TO THE CLAIMS" section. Applicant would like to further clarify the following issues.

As discussed above, each of amended Claims 1 and 2 is tangibly embodied and provides a practical application. Furthermore, according to one embodiment of the claimed invention, a "translation unit", a "simulation unit" and a "set operation unit" are described as hardware devices in the specification. It is apparent from the description "the function of the above translation unit (8), simulation unit (9) and set operation unit (10) may be realized by software." *See paragraph [0076]*. Furthermore, it is apparent for a person with ordinary skill in the art to embody a "translation unit", a "simulation unit" and a "set operation unit" as hardware devices such as ASIC (Application Specific Integrated Circuit).

Claims 1, 2, 4, 5, 7 and 8 were rejected under 35 U.S.C. § 112, second paragraph asserting that there is insufficient antecedent basis for "equational tree automaton accepts said term to be verified." In reply, throughout the claims, the phrases "a term to be verified" and "a set of terms to be verified" have been changed to "a selected term to be verified" and "a selected set of terms to be verified," respectively, to enhance clarity. In view of the above, withdrawal of the rejections is respectfully requested.

Appl No. : 10/521,671
Filed : September 15, 2005

Discussion of Rejection of Claims under 35 U.S.C. § 102(b)

Claims 1-16 were rejected under 35 U.S.C. § 102(b) as being anticipated by “Abstracting Cryptographic protocols with Tree Automata” (SRI International & Computer Science Lab, June 1999) to Monniaux, et al. (hereinafter “Monniaux”). As discussed above, Claims 10-12 and 16 have been cancelled. Applicant respectfully submits that pending Claims 1-9 and 13-15 are allowable over Monniaux as discussed below.

Rationale of 35 U.S.C. § 102

“For a prior art reference to anticipate a claim under 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference.” *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 677, 7 USPQ 2d 1315, 1317 (Fed. Cir. 1988).

Discussion of Patentability of Pending Claims

Independent Claim 1 recites, among other things, that said second equational tree automaton is generated through first and second repetition processes, wherein said first repetition process comprises (D) obtaining a sixth equational tree automaton by *performing repeatedly said (B) selecting and (C) determining processes* regarding all elements p positioned at the ends of said tree-structure of said first group and wherein said second repeated process comprises (H) obtaining said second equational tree automaton by *performing repeatedly said (F) selecting and (G) determining processes* regarding all elements q positioned at the ends of said tree-structure of said second group. Each of independent Claims 2, 4, 5, 7 and 8 includes substantially the same as or similar features to those of independent Claim 1. Applicant respectfully submits that Monniaux does not disclose the above-indicated features of the claimed invention.

Monniaux discloses that match (A, t) is defined, where A is an automation, characterized by the Examiner to correspond to the claimed second equational tree automation. *See 3.2 third paragraph of Monniaux*. Monniaux also discloses that a function match is constructed so as to have the same property and that the match is defined using an effective test of whether the languages of several automata intersect. *See 3.2 fourth and fifth paragraphs*.

Appl No. : 10/521,671
Filed : September 15, 2005

In contrast, in the claimed invention, the second equational tree automaton is generated through the first and second repetition processes, wherein the first repetition process comprises specific repetition procedures as indicated in the above (B) and (C), and the second repetition processes comprises specific repetition procedures as indicated in the above (F) and (G). For example, in one embodiment of the claimed invention, as described in paragraphs [0053] – [0061] and shown in Figure 3, the simulation unit (9) generates the equational tree automaton which accepts extended knowledge by repeatedly processing, using the equational tree automaton $\{A_i\}$ read out from the memory (2) as initial data. In one embodiment, “the above-indicated equational tree automaton” corresponds to the claimed second equational tree automaton. *See, for example, the specification of this application at paragraphs [0054] – [0061] and Figure 3.*

In view that Monniaux constructs or defines the match (A, t) using a different way which is irrelevant to the claimed specific repetition processes, Applicant respectfully submits that Monniaux does not disclose the above-indicated features of the claimed invention.

In addition, Applicant notes that it is well known to a person with ordinary skill in the art that Hybrid automata and the technique disclosed by Monniaux are difficult to be processed automatically. With respect to Hybrid automata, it is a theory produced by combining a transition system (automaton) and restriction requirements. Applicant further notes that it is known to a skilled person that the verification of Hybrid automata is generally undecidable, hence it is difficult to embody an automatic verification system by Hybrid automata theory. Applicant respectfully submits that with respect to Monniaux, it is required for a user to define abstracting functions, because the definition of abstracting functions which are suitable for a certain verification process cannot automatically be done. Therefore, it is difficult to embody an automatic verification system by Monniaux.

In contrast, Applicant notes that an automatic verification system can be embodied by one embodiment of the claimed invention, for example, as described in paragraphs [0100] and [0112]. These paragraphs describe “Calculation is automatically executed by using this automaton, and the safety of the cipher communication procedure is assessed.”

In view that Monniaux does not disclose or teach the above-indicated features of each of independent Claims 1, 2, 4, 5, 7 and 8, Applicant respectfully submits that Monniaux does not

Appl No. : **10/521,671**
Filed : **September 15, 2005**

disclose every element of each independent claim, and therefore, all independent claims are not anticipated by Monniaux.

Claims 3, 6, 9 and 13-15 depend from base Claim 1, 2, 4, 5, 7 or 8, and further define additional technical features of the present invention. In view of the patentability of their base claims, and in further view of their additional technical features, Applicant respectfully submits that the dependent claims are patentable over the prior art.

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Appl No. : 10/521,671
Filed : September 15, 2005

CONCLUSION

In view of Applicant's foregoing amendments and remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

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